

United States Patent [19]

Degner et al.

[11] Patent Number: **5,074,456**[45] Date of Patent: **Dec. 24, 1991**[54] **COMPOSITE ELECTRODE FOR PLASMA PROCESSES**

[75] Inventors: Raymond L. Degner, Los Altos; Eric H. Lenz, Palo Alto, both of Calif.

[73] Assignee: LAM Research Corporation, Fremont, Calif.

[21] Appl. No.: 584,324

[22] Filed: Sep. 18, 1990

[51] Int. Cl.⁵ B44C 1/22; C23C 15/00; B01J 19/08; C23F 1/02

[52] U.S. Cl. 228/121; 228/122; 228/177; 204/298.01; 445/51; 156/345; 361/229; 29/592.1

[58] Field of Search 228/121, 122, 123, 177, 228/263.12; 445/46, 51; 156/345; 118/621; 250/324; 361/227-231; 204/298.01; 29/592.1

[56] References Cited

U.S. PATENT DOCUMENTS

4,158,589 6/1979 Keller et al. .
 4,407,708 10/1983 Landau .
 4,534,816 8/1985 Chen et al. .
 4,590,042 5/1986 Drage .
 4,595,484 6/1986 Giammarco et al. .

4,612,077 9/1986 Tracy et al. .
 4,793,975 12/1988 Drage 219/121.43

FOREIGN PATENT DOCUMENTS

19731 1/1988 Japan 445/51

Primary Examiner—Samuel M. Heinrich

Attorney, Agent, or Firm—Townsend and Townsend

[57] **ABSTRACT**

An electrode assembly for a plasma reactor, such as a plasma etch or plasma-enhanced chemical vapor deposition reactor, comprises an electrode plate having a support frame attached to one surface thereof. The electrode plate is composed of a substantially pure material which is compatible with a particular reaction being performed in the reactor, while the support frame is composed of a material having desirable thermal, electrical, and structural characteristics. The support frame is bonded to the electrode plate using a bonding layer, usually a ductile metallic bonding layer, which provides effective thermal and electrical coupling while permitting a degree of thermal expansion mismatch between the support frame and the electrode plate.

36 Claims, 3 Drawing Sheets

